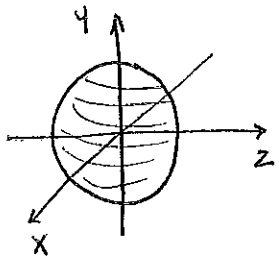
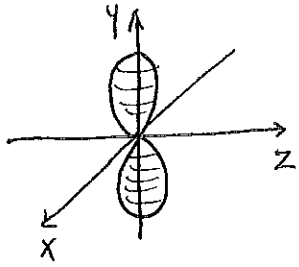
Worksheet 3a

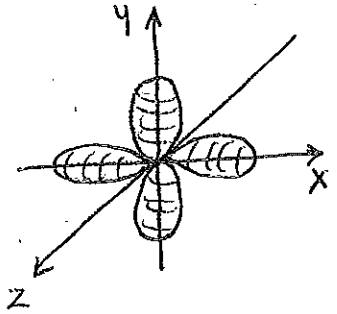
1) Look at the orbital models and draw a picture of an s, a p and a d orbital. How many nodal planes does each of these orbitals have? How many nodal planes would you expect an f orbital to have?



s orbital
no nodal plane
(1s)



p_y orbital
one nodal plane
(2p)



dx^2-y^2 orbital
two nodal planes
(3d)

f orbitals ⇒ three nodal planes
(4f)

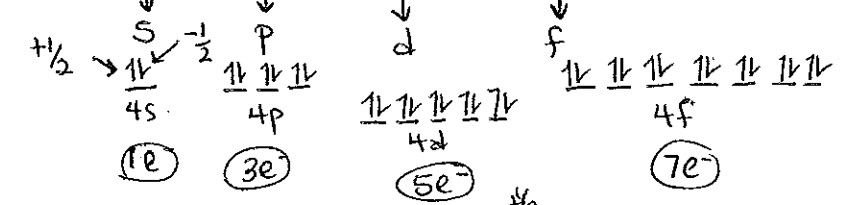
2) What is the maximum number of electrons in an atom that can have these **quantum numbers:**

a) n=4, m_S=-1/2 ⇒ 16 e^-s

b) n=3, l=1, m_S=+1/2 ⇒ 3 e^-s

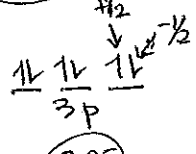
c) n=5, l=3 ⇒ 14 e^-s

(a) n=4 ⇒ l = 0 (s), 1 (p), 2 (d), 3 (f)



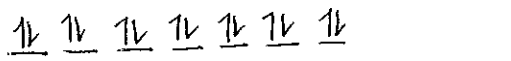
only one e^- in each orbital can have $m_S = -½$

(b) n=3, l=1 ⇒ 3p subshell



only one e^- in each orbital can have $m_S = +½$

(c) n=5, l=3 ⇒ 5f subshell



⇐ 14 e^-s